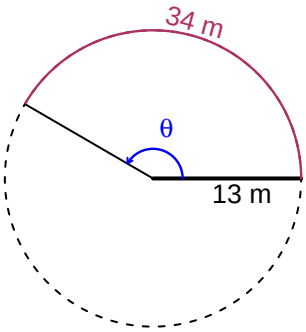
Name: Date:

Trig Final (Solution v33)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 34 meters. The radius is 13 meters. What is the angle measure in radians?

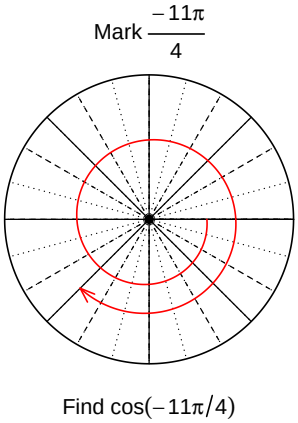


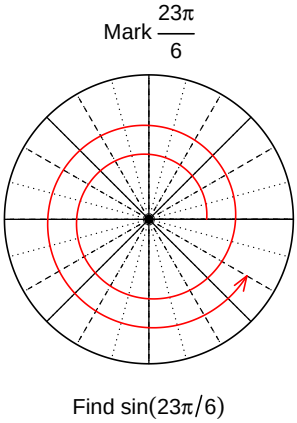
$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

$\theta = 2.615$ radians.

Question 2

Consider angles $\frac{-11\pi}{4}$ and $\frac{23\pi}{6}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{-11\pi}{4}\right)$ and $\sin\left(\frac{23\pi}{6}\right)$ by using a unit circle (provided separately).





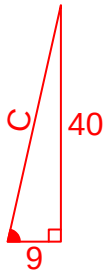
$\cos(-11\pi/4) = \frac{-\sqrt{2}}{2}$

$\sin(23\pi/6) = \frac{-1}{2}$

Question 3

If $\tan(\theta) = \frac{40}{9}$, and θ is in quadrant III, determine an exact value for $\cos(\theta)$.

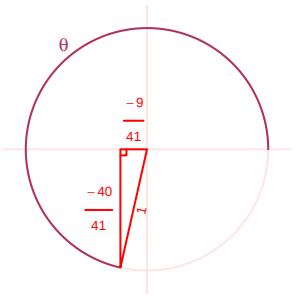
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$9^2 + 40^2 = C^2$$
$$C = \sqrt{9^2 + 40^2}$$
$$C = 41$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant III in a unit circle.



$$\cos(\theta) = \frac{-9}{41}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = -6.18$ meters, an amplitude of 8.79 meters, and a frequency of 7.53 Hz. At $t = 0$, the mass is at the minimum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -8.79\cos(2\pi 7.53t) - 6.18$$

or

$$y = -8.79\cos(15.06\pi t) - 6.18$$

or

$$y = -8.79\cos(47.31t) - 6.18$$